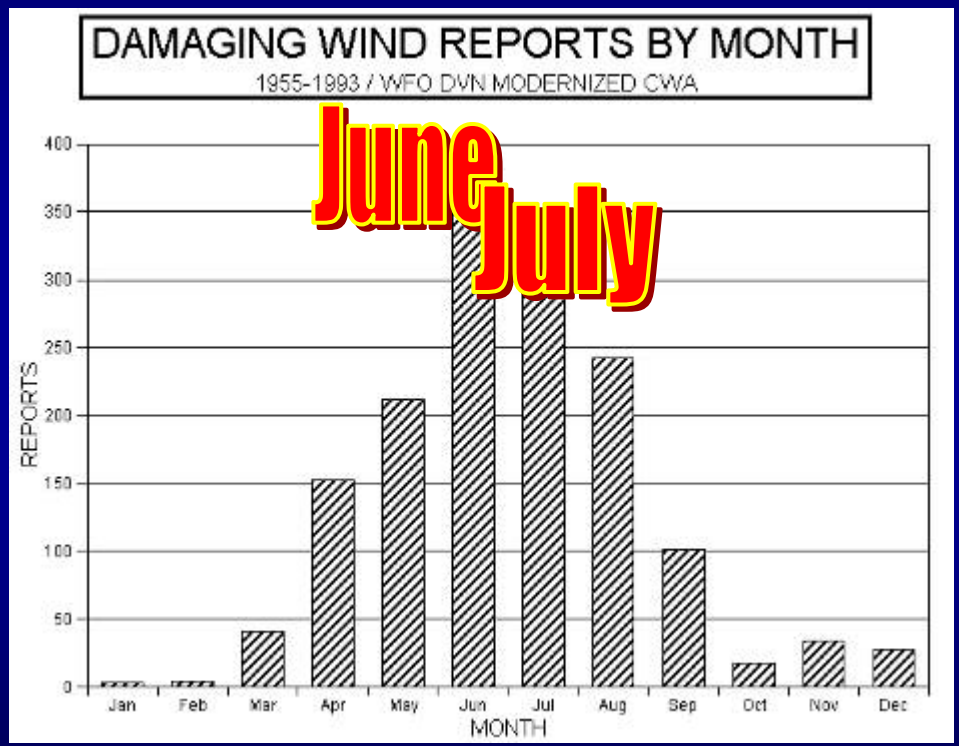
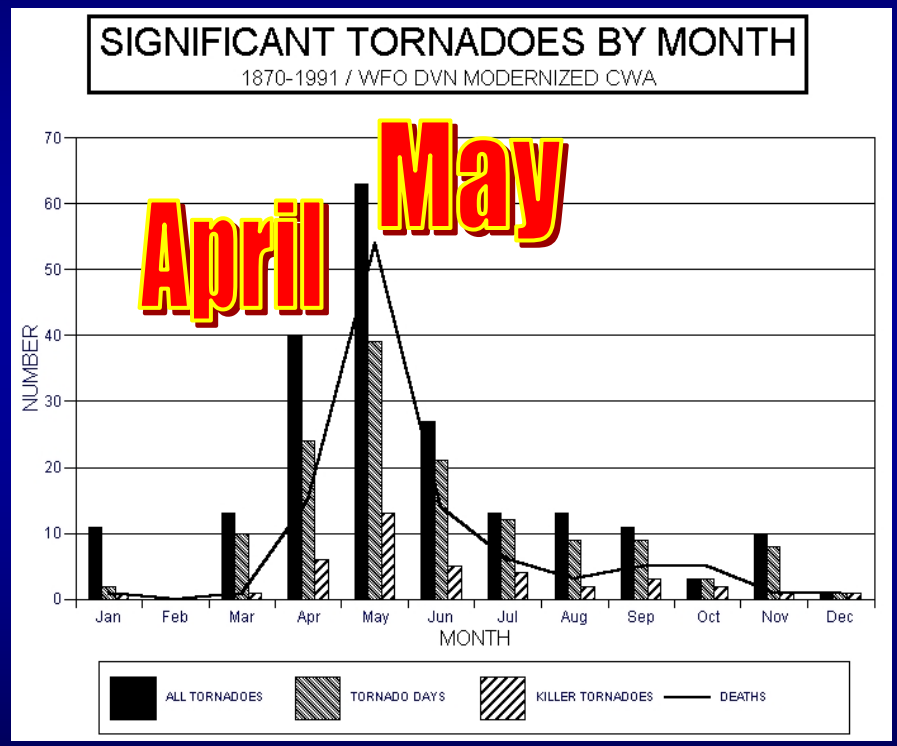

Storm Spotter Training
National Weather Service
Quad Cities

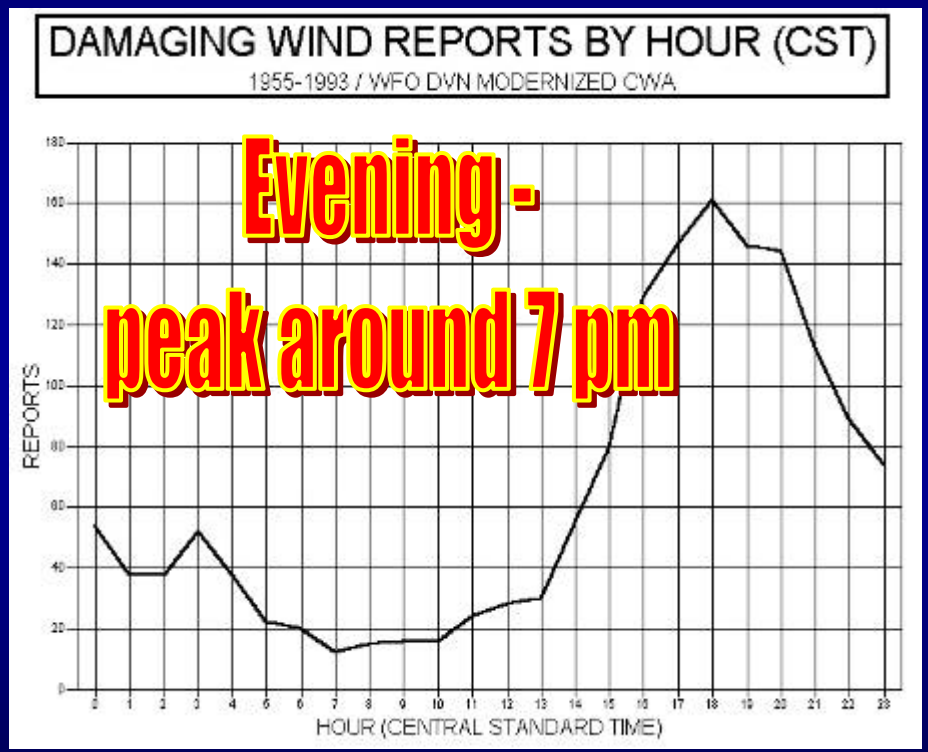
When and how often do we have severe wind or tornadoes in the Quad Cities area?

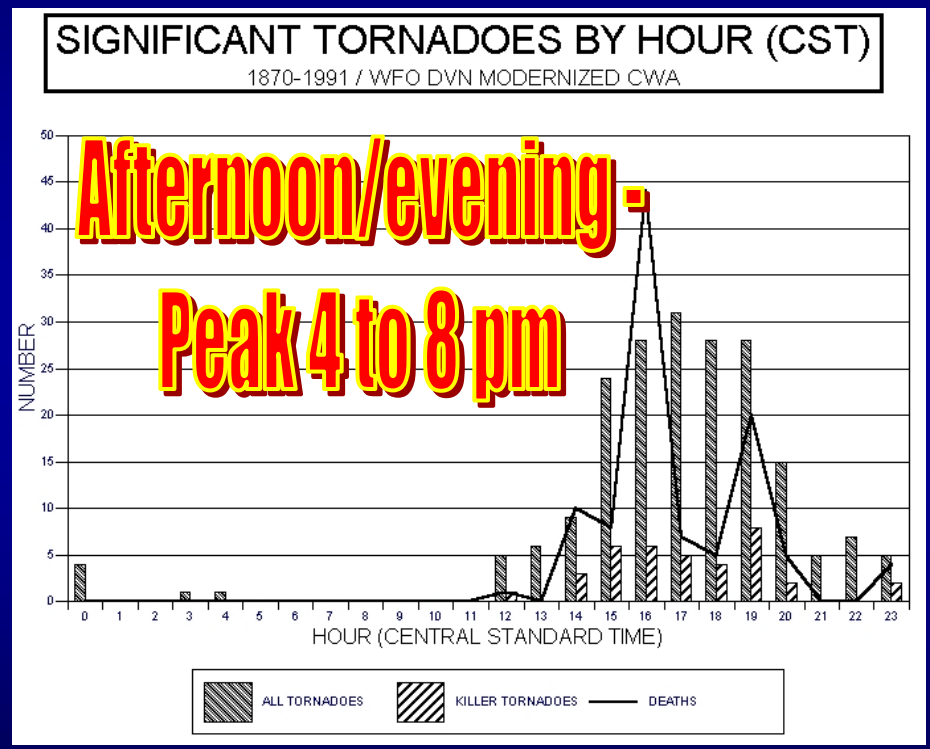
Tornados and Extreme Wind: Season



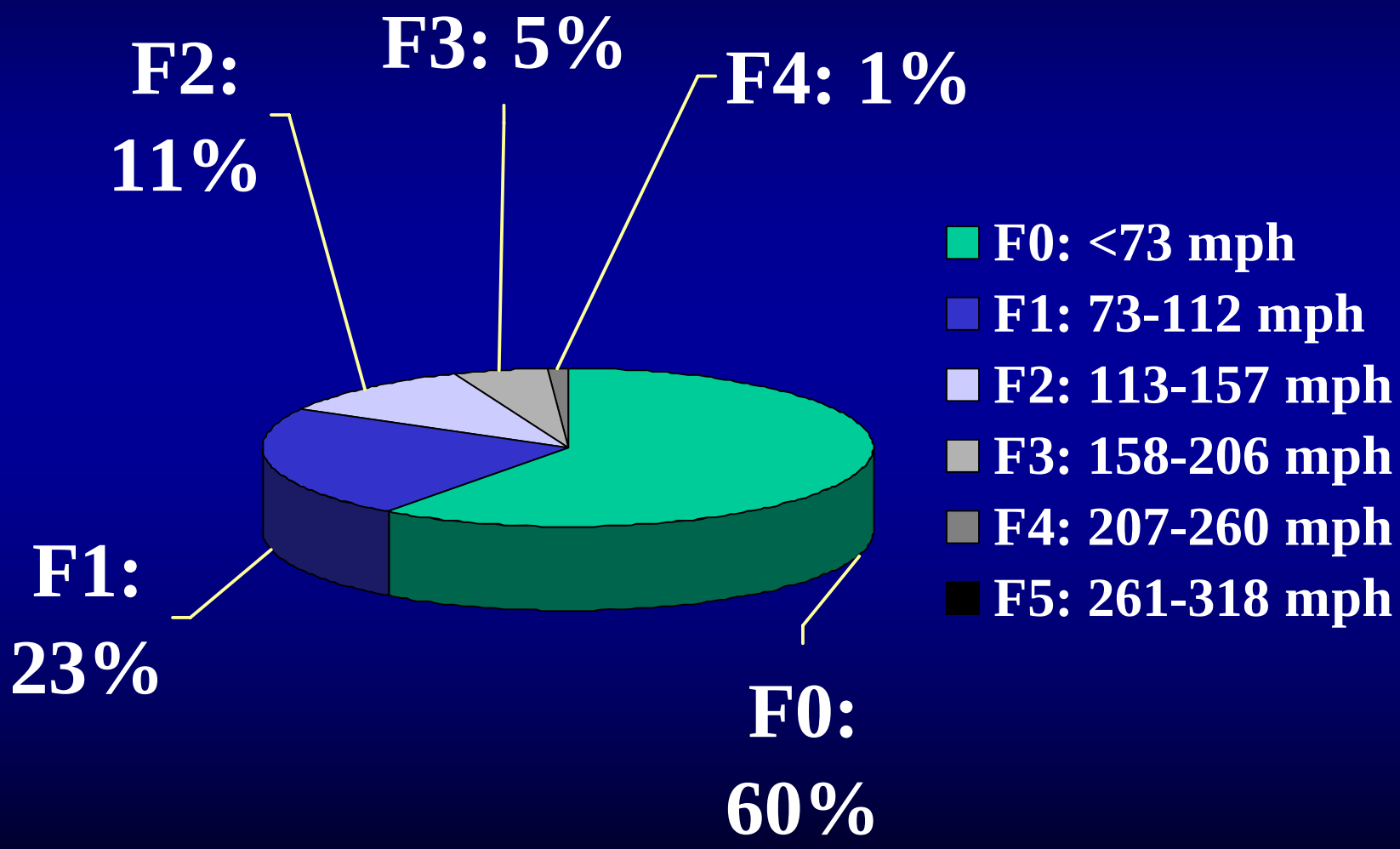


Tornados and Extreme Wind: Time of Day





Tornados: Strength



Objectives

- Safety
- Anticipation
- Step-by-Step Spotting

Safety
Don't become a statistic!

Safety First!!!

- Be aware of your surroundings:
  - Lightning, Hail, and Wind
- Tunnel vision
- Visibility – Night?
- And if mobile:
  - Traffic, Road Conditions, Flooding, Distractions

Objectives

- Safety
- Anticipation
- Step-by-Step Spotting

Anticipation

Planning ahead is the key!

Know what you're getting yourself into:

- What's the main threat?
- When is the best chance?
- Where is it expected to happen?

Anticipation

- Hazardous Weather Outlook
  - Issued every day around 5 A.M.
  - Planning tool for severe weather potential
- Watches
  - Severe weather is possible in and close to watch area. Closely monitor weather and warnings. Actions?
- Warnings
  - Severe weather is imminent or already occurring. Hope you're in position by now!
  - Danger! Life threatening!

Anticipation

Where do I get official information from the National Weather Service?

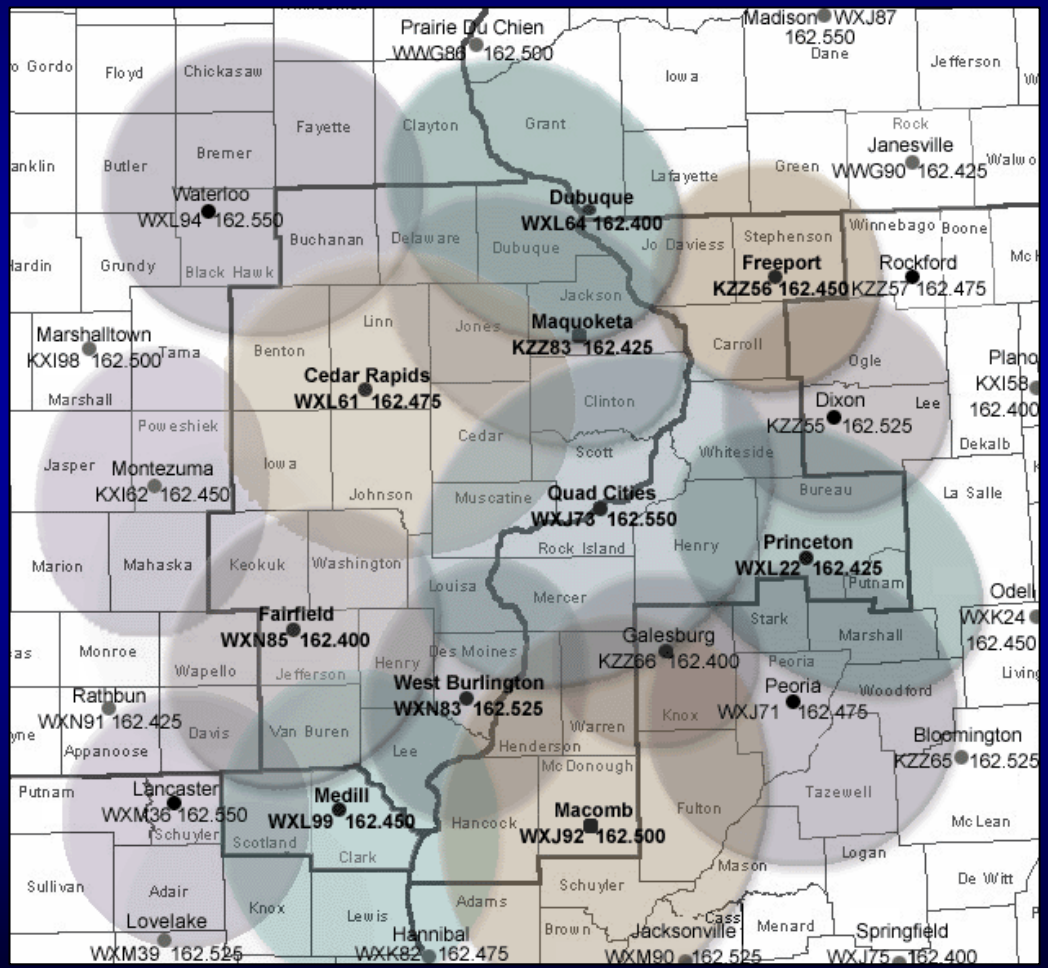
Anticipation

NOAA Weather Radio All-Hazards

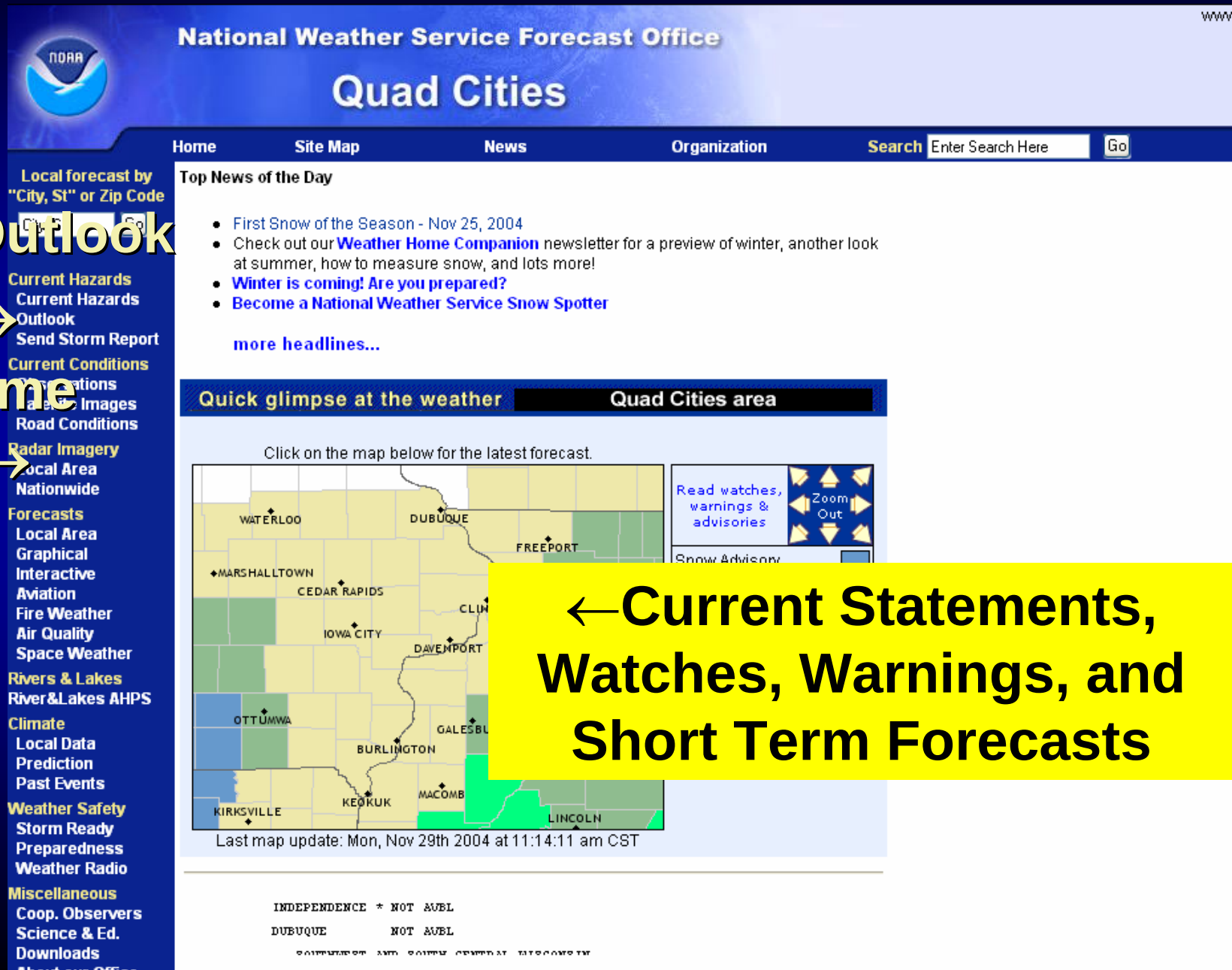
- Public Service of NOAA
- Continuous weather information
- All Hazards Warning Network, including local emergencies such as toxic spills and Amber Alerts
- Uses a special radio or scanner to receive broadcasts
- Fastest, most direct way to receive warnings
- *"Smoke Detector of Severe Weather"*

Weather Radio

- 11 local stations
- 6 nearby stations
- Complete local coverage



weather.gov/quadcities



Outlook →

Real-Time Radar →

←Current Statements, Watches, Warnings, and Short Term Forecasts

Objectives

- Safety
- Anticipation
- Step-by-Step Spotting

Storm Spotting
Step – by - Step

Step 1: Identify the updraft (and downdraft)
Step 2: Determine storm motion
Step 3: Make sure your location is safe
Step 4: Assess strength/potential
Step 5: Look for visible rotation in updraft
Step 6: Watch updraft for wall cloud / tornado with rotation
Step 7: Watch downdraft for strong winds / hail
Step 8: Report critical information

Storm Features

Definitions

All thunderstorms have updrafts and downdrafts. Any thunderstorm can produce downbursts, heavy rain, and deadly lightning.

Supercell: An intense thunderstorm with a rotating updraft. Frequently produce: wall clouds, tornadoes, and large hail.

Squall Line: An intense line of thunderstorms. Can produce: damaging straight line winds and hail.

Storm Features

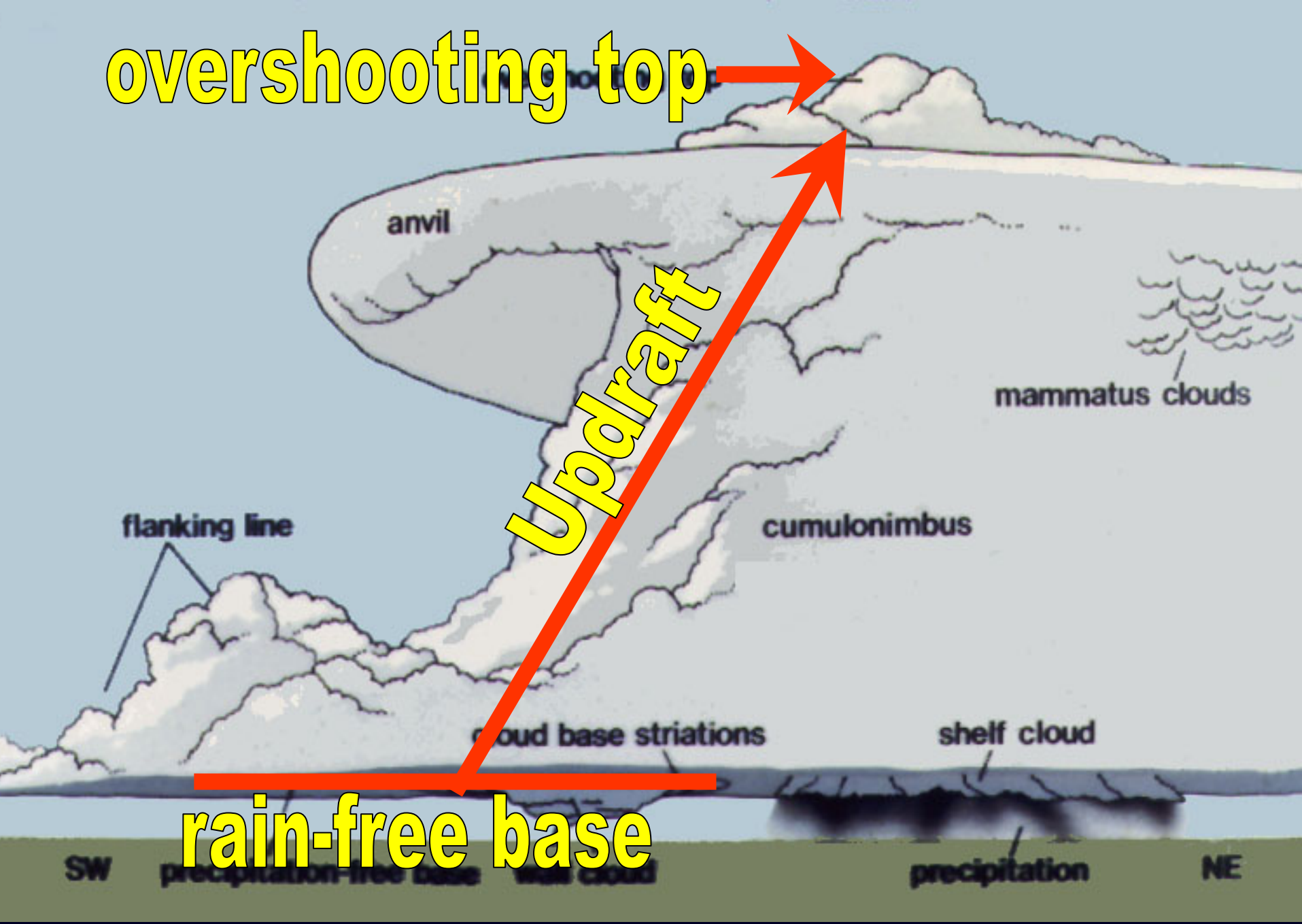
Updraft

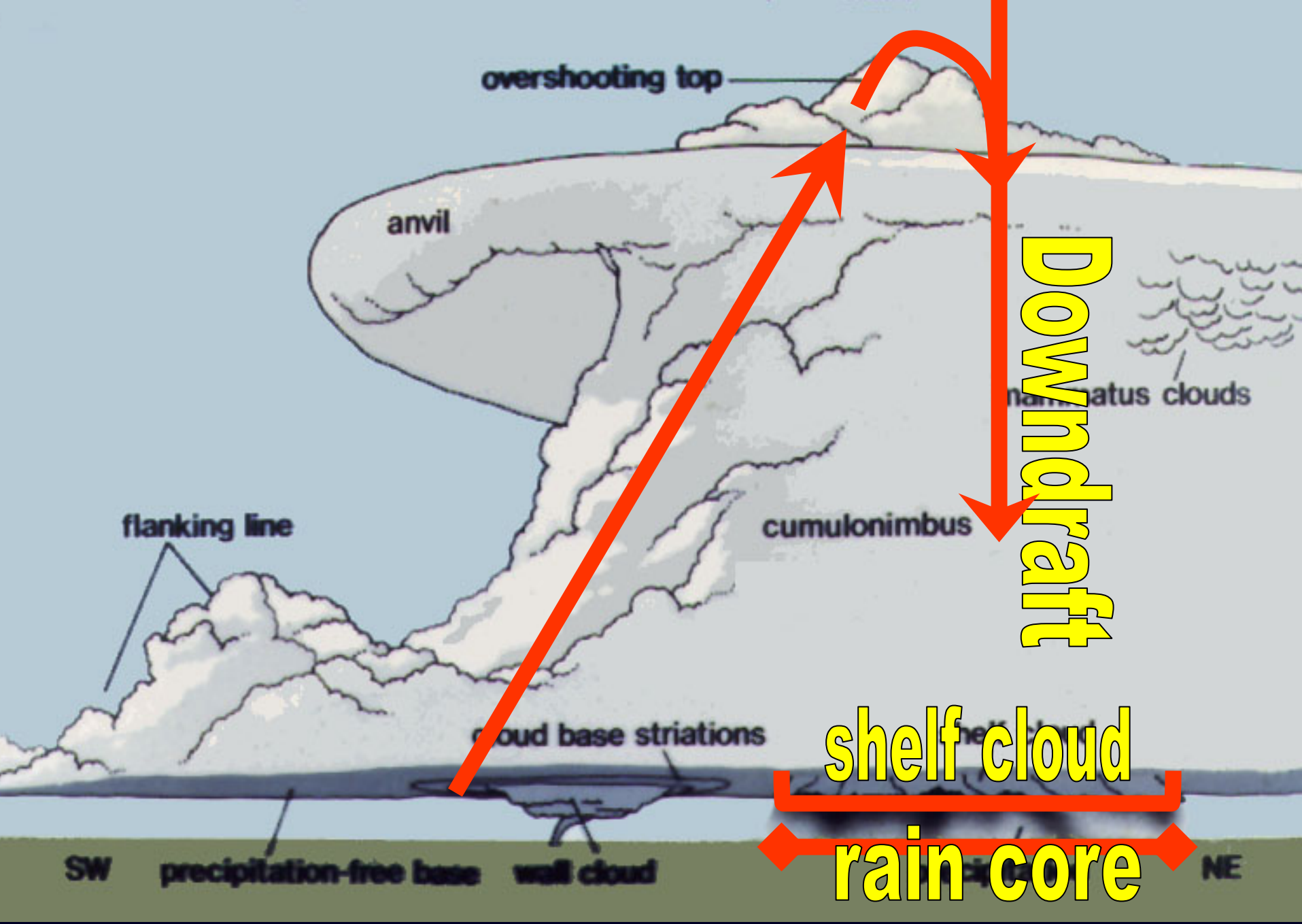
- Updraft: part of the storm where air rises (usually on the west or southwest side of the storm)
- The stronger the updraft the stronger the storm.
- Look for billowy, puffy, cauliflower clouds – That's updraft!

Storm Features

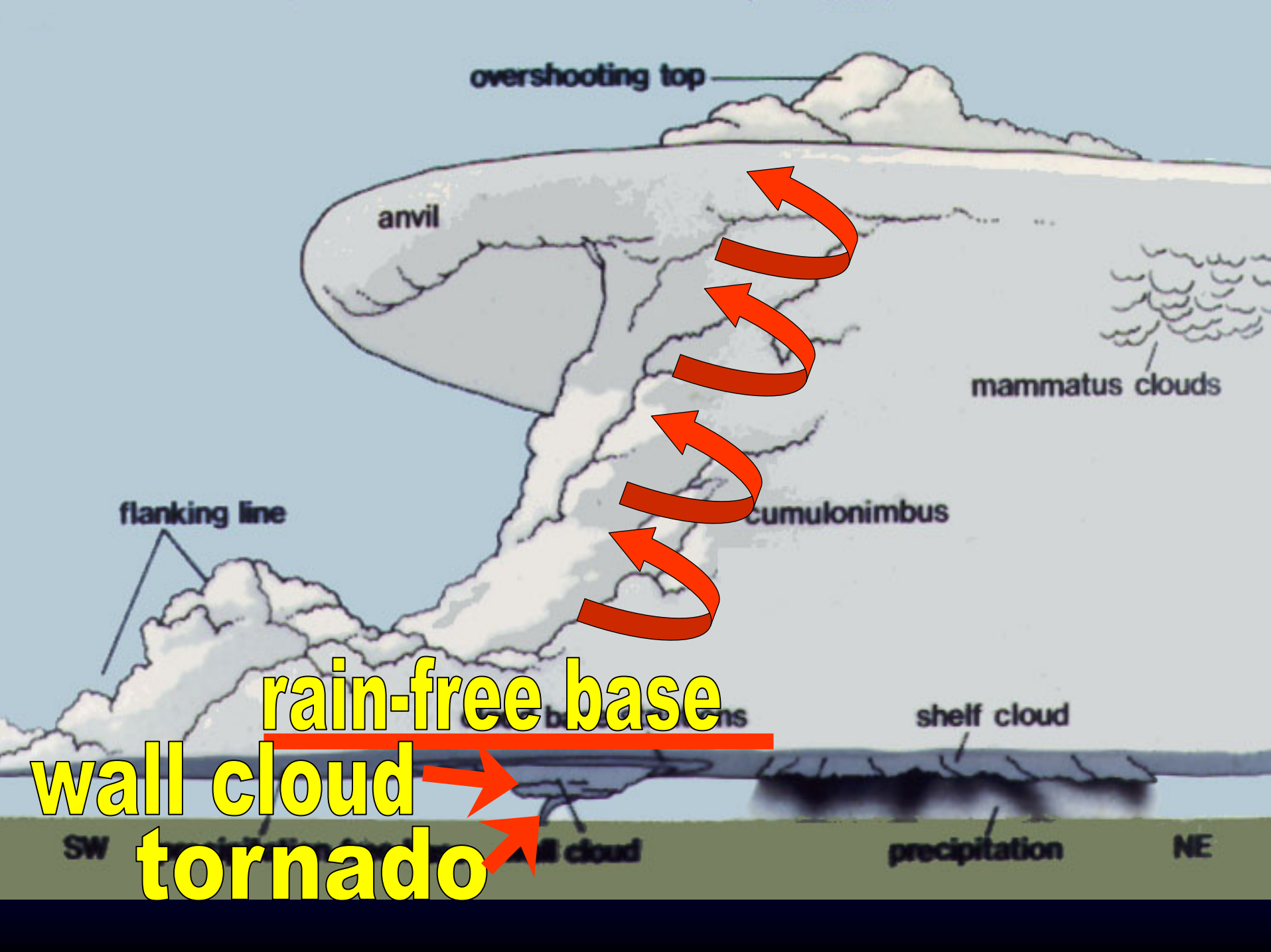
Downdraft

- Downdraft: part of the storm where air sinks
- Look for the main rain part of the storm.


overshooting top
anvil
Updraft
mammatus clouds
flanking line
cumulonimbus
cloud base striations
shelf cloud
rain-free base
SW
precipitation-free base
precipitation
NE


overshooting top
anvil
Downdraft
flanking line
cumulonimbus
cloud base striations
shelf cloud
rain core
SW
precipitation-free base
wall cloud
NE

Where does the rotation come in?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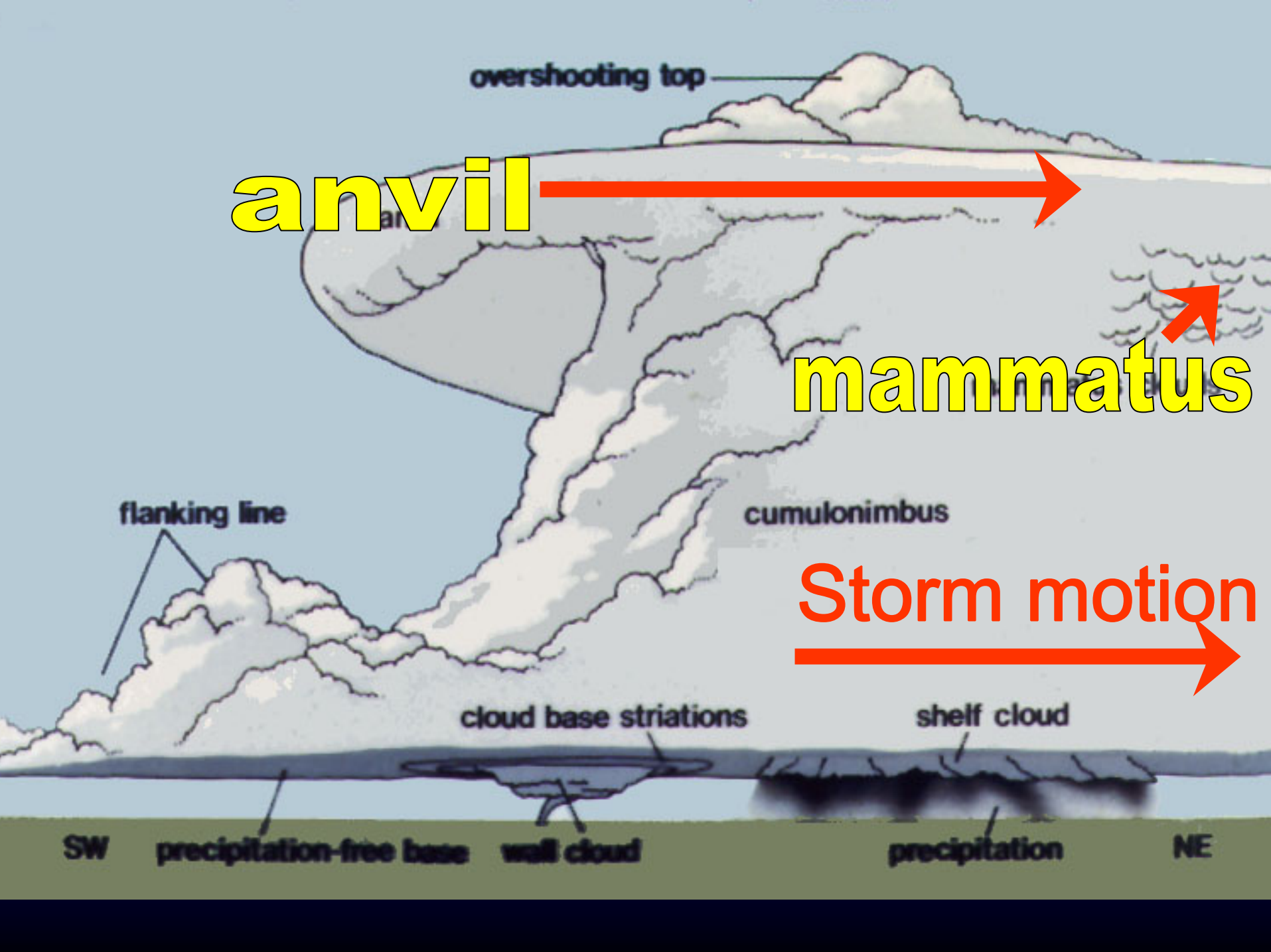
overshooting top
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Storm motion
cloud base striations
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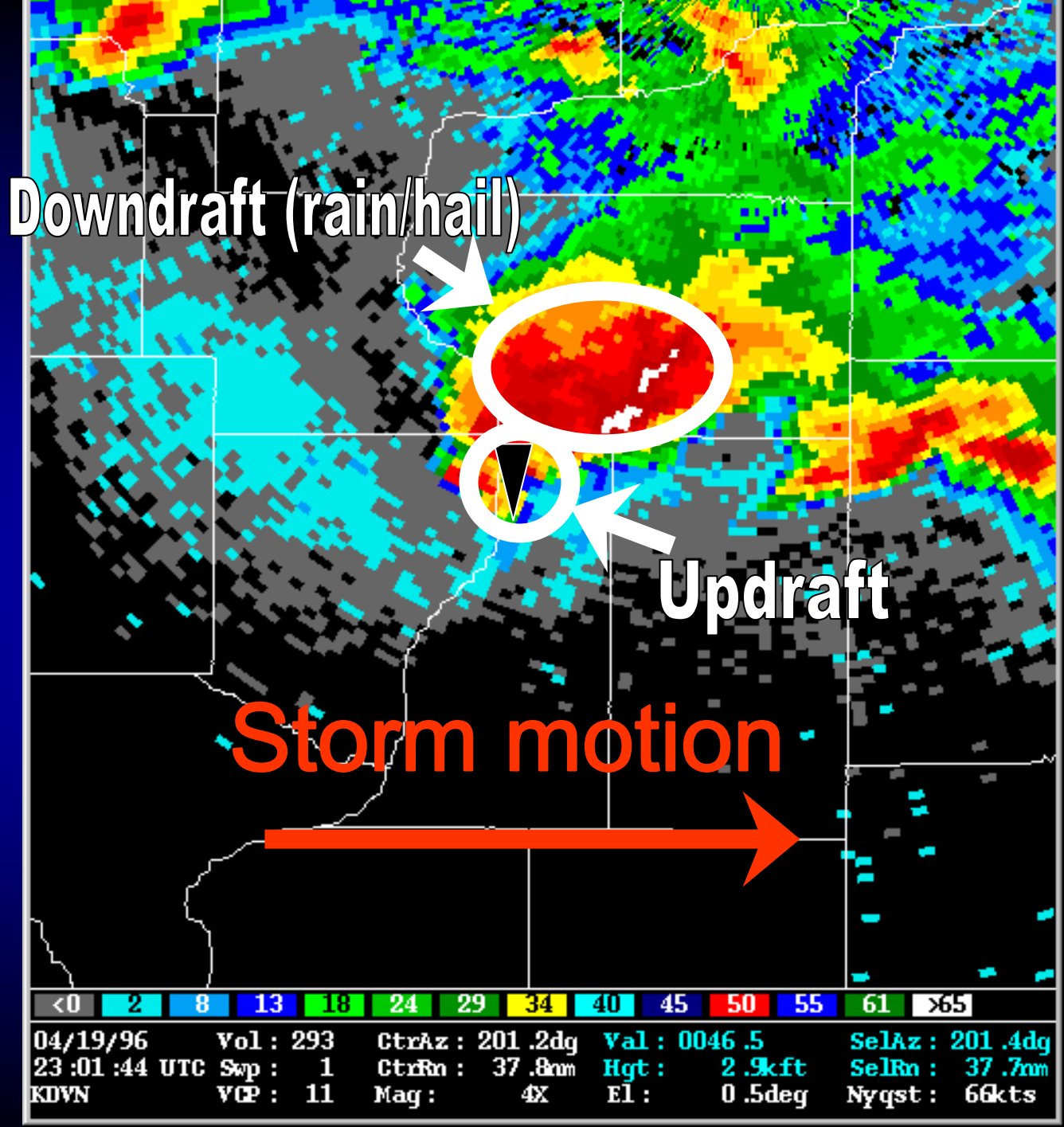
Downdraft (rain/hail)
Updraft
Storm motion
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23 :01 :44 UTC Swp : 1 CtrRn : 37 .8nm Hgt : 2 .9kft SelRn : 37 .7nm
KDVN VCP : 11 Mag : 4X El : 0 .5deg Nyqst : 66kts

Let’s try it with some real storms…


Anvil
Overshooting Top
Updraft


Updraft


Updraft

members.cox.net


Updraft

What Goes Up…

Rain Free Base

- Bottom of the updraft where warm air enters the storm
- Primary region for tornado development

What Goes Up…

Rain Free Base

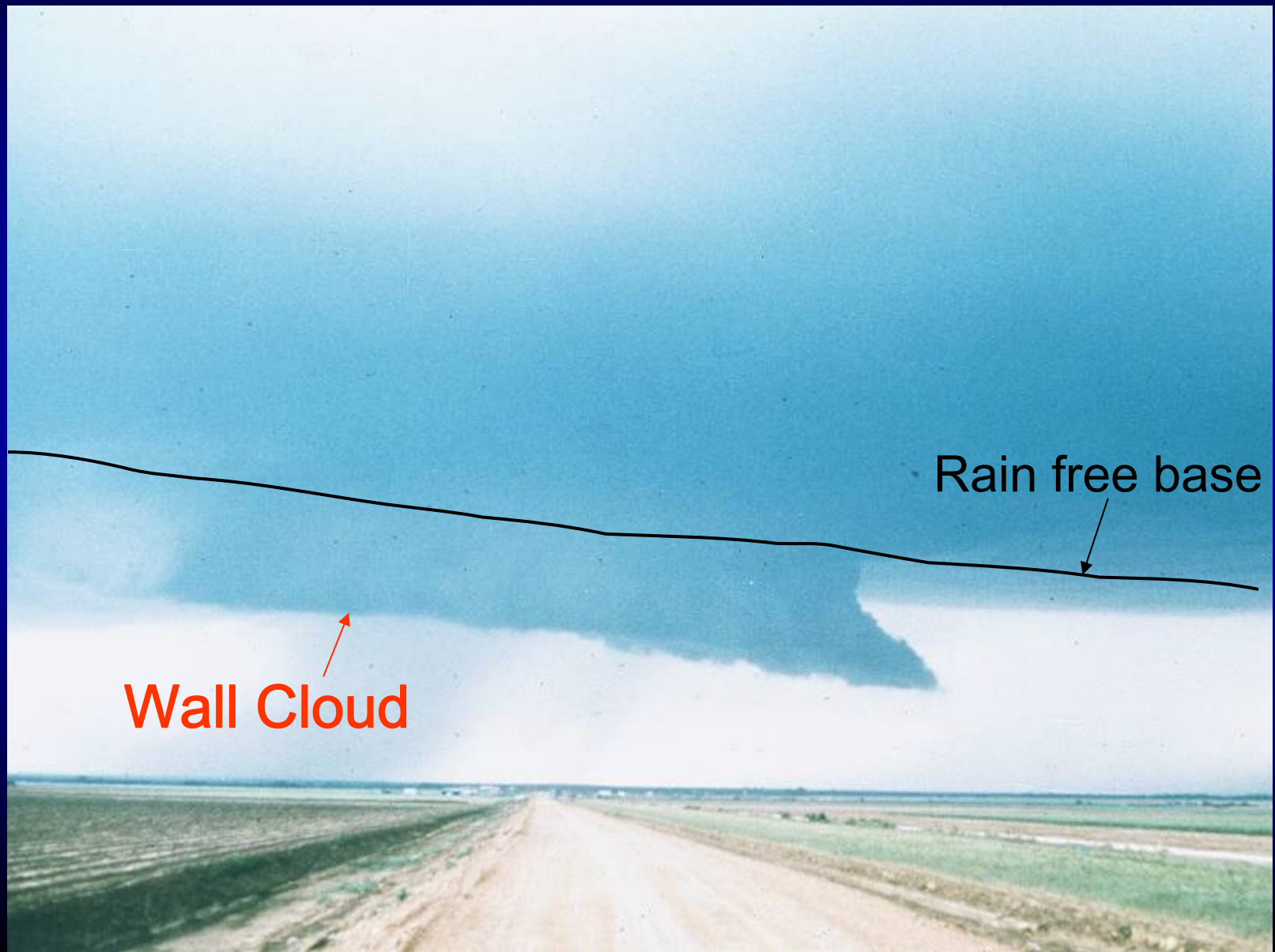
What Goes Up…

Wall Cloud

- Isolated cloud lowering attached to the rain-free base
- Favored area for tornado development

What Goes Up…

Wall Cloud



What Goes Up…

Wall Cloud

Cedar Rapids – May 30, 2002. Photo courtesy Alan Erickson.

What Goes Up…

Wall Cloud

Downey, IA. Photo courtesy Jim Lee.

What Goes Up…
Tornado

What is a Tornado?

A rapidly rotating column of AIR in contact with the ground.

- May or may not have a visible funnel
- Will have rotation and debris

Cordell, OK. Photo courtesy NOAA Photo Library

What goes up…

Must come down!

…Must come down!

Shelf Cloud/Gust Front

- Shelf Clouds occur on the leading edge of the downdraft
- When you see a shelf cloud, think strong winds
- Be ready to report wind gust speeds and possible wind damage.

…Must come down!

Shelf Cloud/Gust Front

…Must come down!

Shelf Cloud/Gust Front

Downey, IA. Photo courtesy Jim Lee.

…Must come down!

Shelf Cloud/Gust Front

…Must come down!

Rain Core

- The main feature of the downdraft.
- Be ready to report rain totals if over 1 inch, and ANY flooding.
- NEVER cross a flooded roadway!

…Must come down!

Hail

- Hail usually falls in the downdraft, but close to the updraft.
- The larger the hail, the stronger the updraft.
- Be ready to report hail size and possible damage to property and crops.
- Report hail to the nearest coin size or object like a golf ball or baseball.

…Must come down!

Hail

Not all marbles have been created equal!

…Must come down!

Hail

Please report hail sizes in relation to coins or balls.

Any damage or injuries?


…Must come down!
Hail

…Must come down!

Hail

…Must come down!

Downburst

- A sudden “burst” of strong winds and rain/hail in the downdraft.
- Acts like a Gatorade cooler dumped on your head after winning the big game.
- Be ready to report wind gust speeds and possible wind damage.

Beware the bolt.

If you feel your hair standing up on end,
crouch low to the ground.

Updraft. Downdraft.
All around the storm.

It’s easily mistaken,
but it’s just…

Scud.

- Low cloud fragments associated with nearly all thunderstorms.
- No need to report this feature.
- Can help you see air motion near the storm.

Other Lookalikes

Other Lookalikes

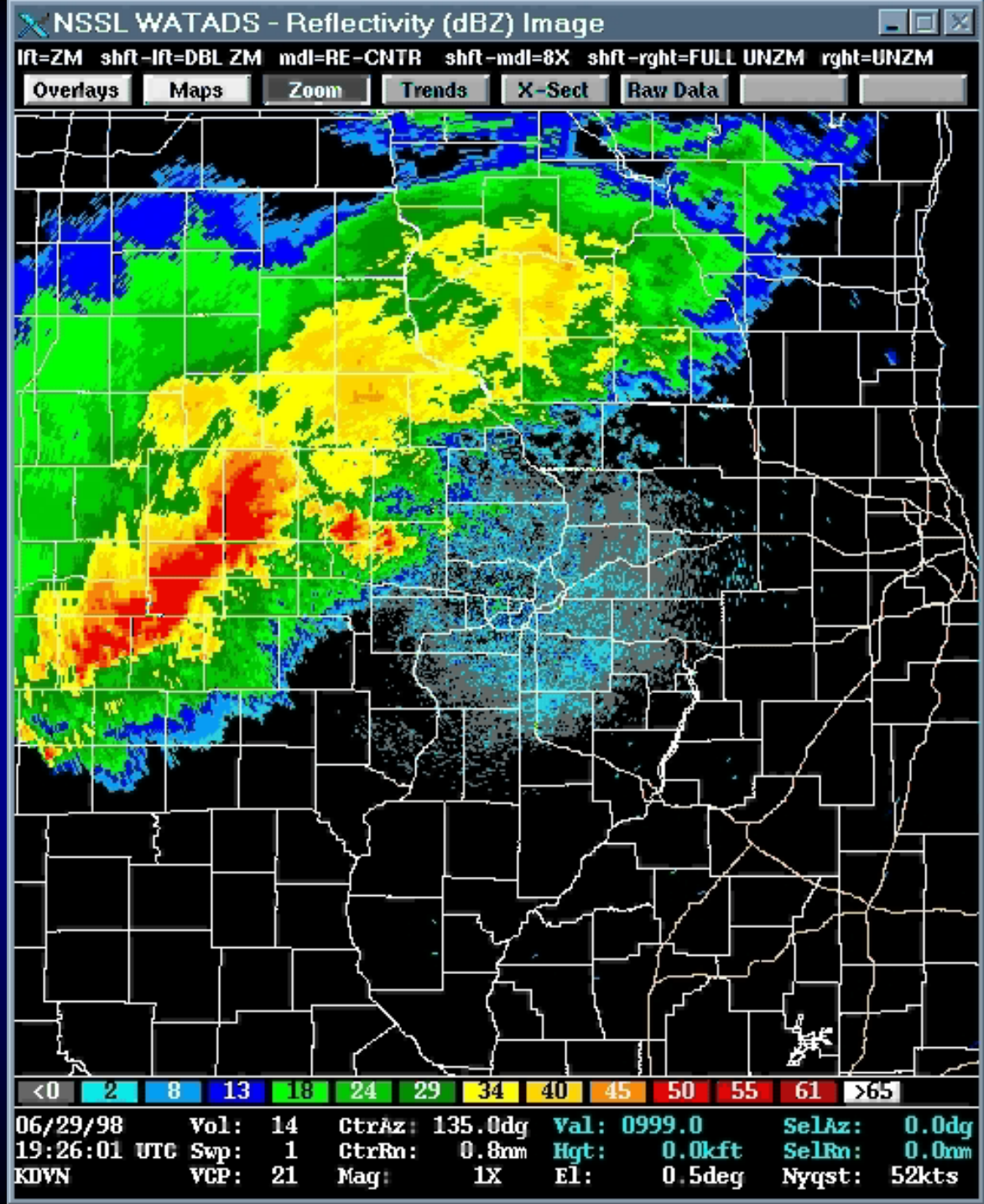
Other Lookalikes

Storm Spotting
Step – by - Step

- ✓ Step 1: Identify the updraft (and downdraft)
- Step 2: Determine storm motion

Storm Motion

- Radar



Storm Motion

- Radar
- Warnings

THE NATIONAL WEATHER SERVICE IN THE QUAD CITIES HAS ISSUED A

* SEVERE THUNDERSTORM WARNING FOR...
  JACKSON COUNTY IN EAST CENTRAL IOWA
  THIS INCLUDES THE CITY OF MAQUOKETA

* UNTIL 1000 PM CDT

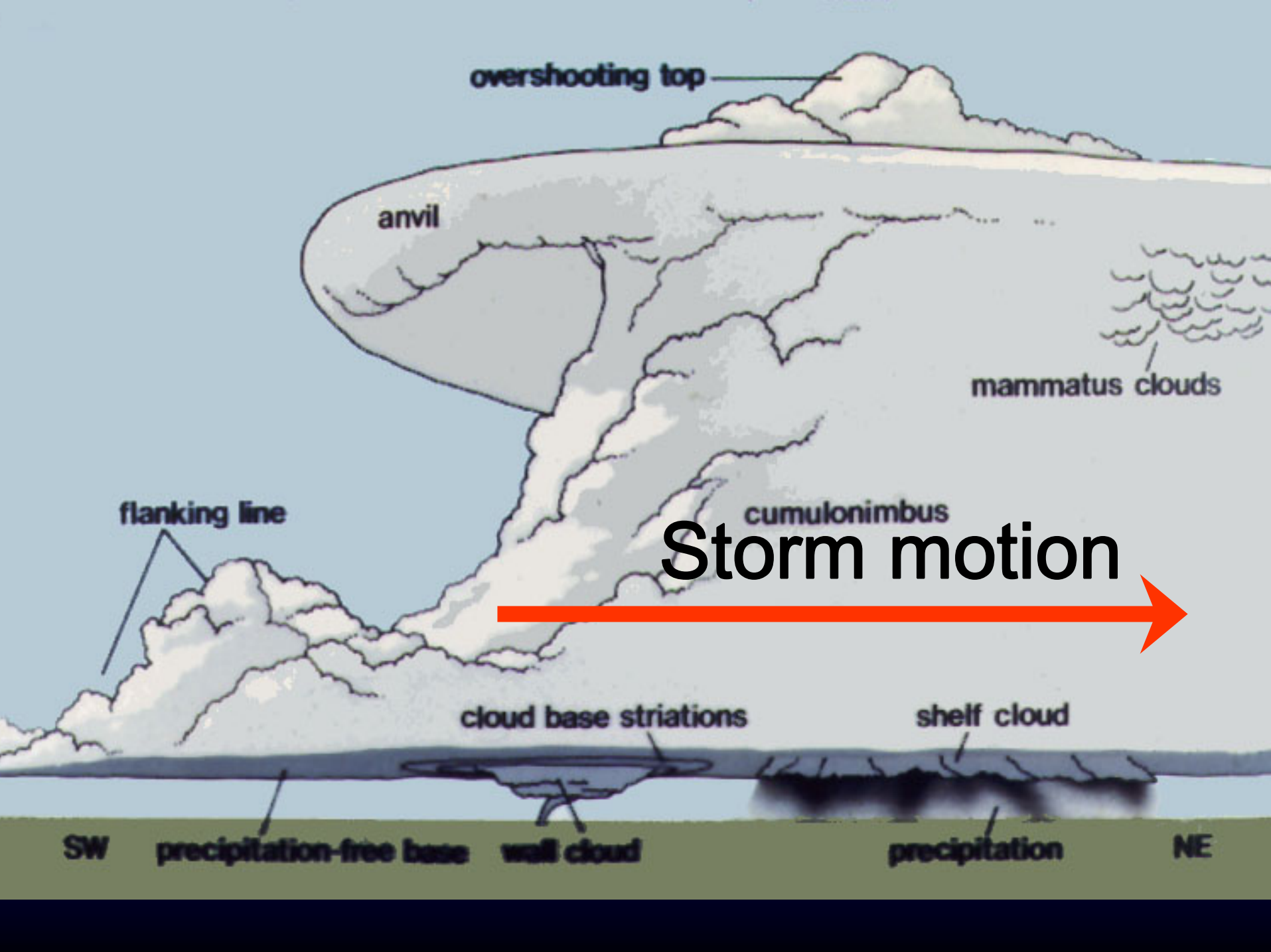
•AT 921 PM CDT...TRAINED WEATHER SPOTTERS REPORTED A SEVERE THUNDERSTORM CAPABLE OF PRODUCING BASEBALL SIZE HAIL...AND DESTRUCTIVE WINDS IN EXCESS OF 70 MPH. **THIS STORM WAS LOCATED 10 MILES SOUTHEAST OF MAQUOKETA...AND MOVING NORTHEAST AT 35 MPH.**

•* THE SEVERE THUNDERSTORM WILL BE NEAR...

MAQUOKETA BY 935 PM CDT
ANDREW BY 945 PM CDT
SPRINGBROOK BY 955 PM CDT

Storm Motion

- Radar
- Warnings
- Sky:
  - storms move in the direction of the anvil
  - Downdraft is leading edge and updraft follows downdraft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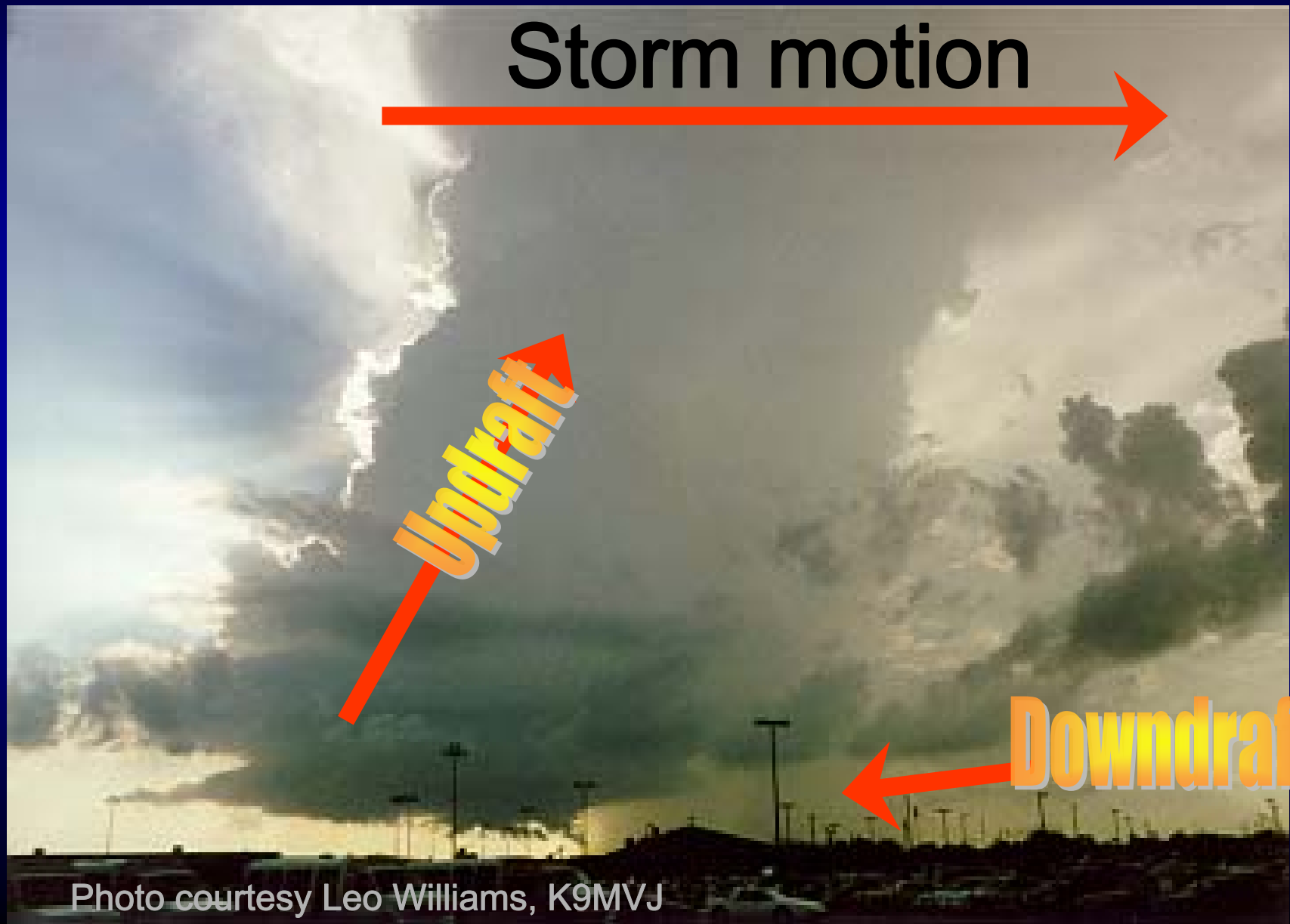
Updraft / Downdraft Orientation



Storm Spotting
Step – by - Step

- ✓ Step 1: Identify the updraft (and downdraft)
- ✓ Step 2: Determine storm motion

Step 3: Make sure your location is safe

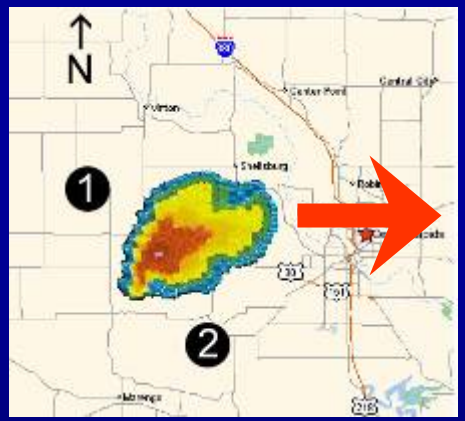
Beware the bolt.

If you are within 10 miles of a thunderstorm, there is always a risk of lightning.

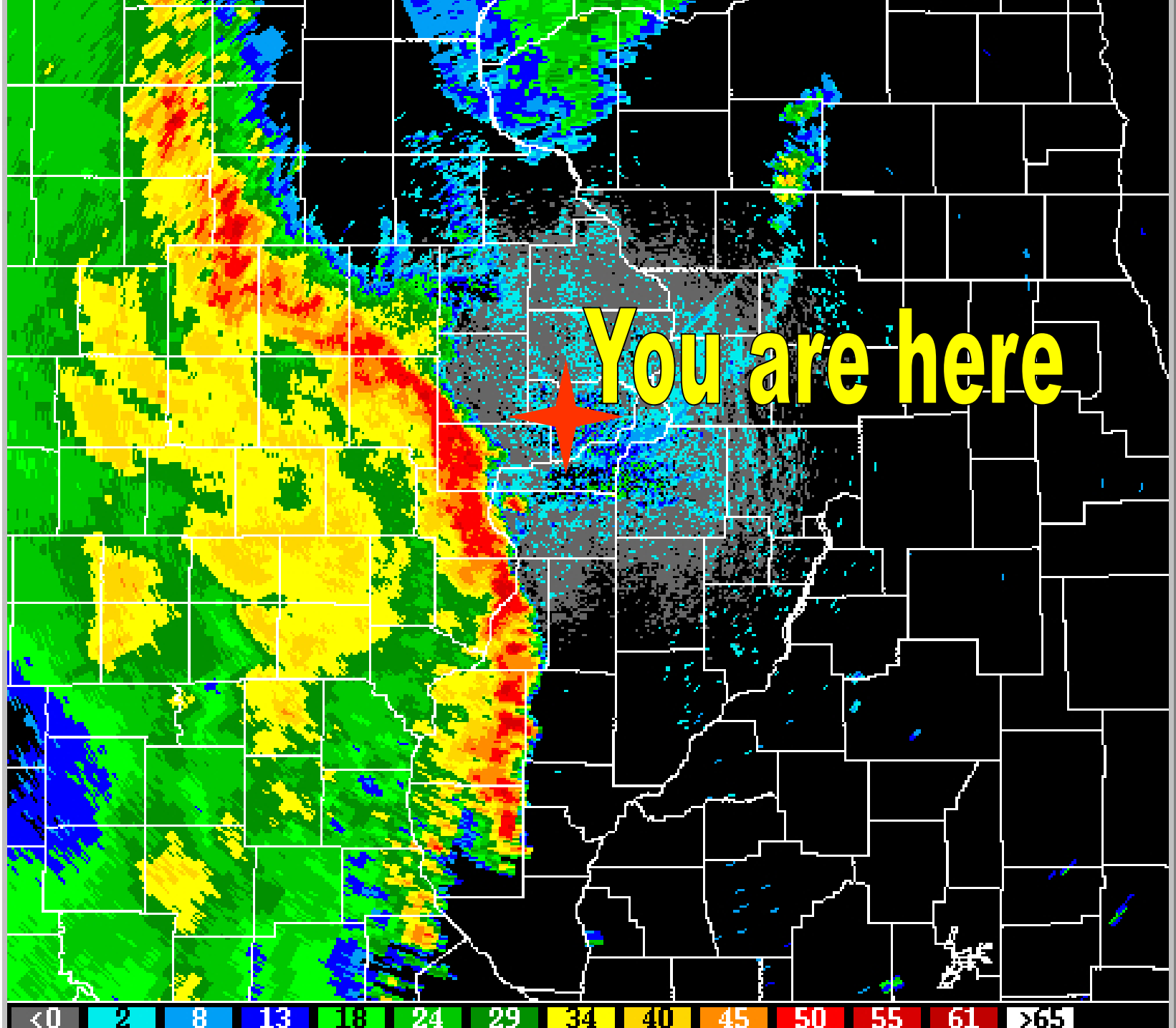
Spotter Perspective

A Tale of Two Spotters

Spotter on northwest side of storm: reports mature supercell with a lot of rain



Spotter on southeast side of storm: reports a well developed wall cloud and a tornado


You are here
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61
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You see this
Photo courtesy Bill Bolton, WB0BBM
2004. 5. 22

Storm Spotting
Step – by - Step

- ✓ Step 1: Identify the updraft (and downdraft)
- ✓ Step 2: Determine storm motion
- ✓ Step 3: Make sure your location is safe
- **Step 4: Assess strength/potential**

Warning

THE NATIONAL WEATHER SERVICE IN THE QUAD CITIES HAS ISSUED A

* SEVERE THUNDERSTORM WARNING FOR...
  WHITESIDE COUNTY IN NORTHWEST ILLINOIS
  THIS INCLUDES THE CITY OF MORRISON

* UNTIL 1000 PM CDT

*** AT 921 PM CDT...TRAINED SPOTTERS REPORTED A SEVERE THUNDERSTORM CAPABLE OF PRODUCING BASEBALL SIZED HAIL...AND DESTRUCTIVE WINDS IN EXCESS OF 70 MPH.**

THIS STORM WAS LOCATED 10 MILES SOUTHWEST OF MORRISON...AND MOVING EAST AT 35 MPH.

* THE SEVERE THUNDERSTORM WILL BE NEAR...

MORRISON BY 935 PM CDT
ROUND GROVE BY 945 PM CDT
STERLING ROCK FALLS BY 955 PM CDT

Storm Strength Visual Clues

Strong:

- Crisp, sharp edges
- Fast growth
- Large overshooting top
- Visible upward motion
- Visible rotation

Weak:

- Fuzzy edges
- Small/no overshooting top
- No detectable upward motion or rotation

Stronger:

Tall storm

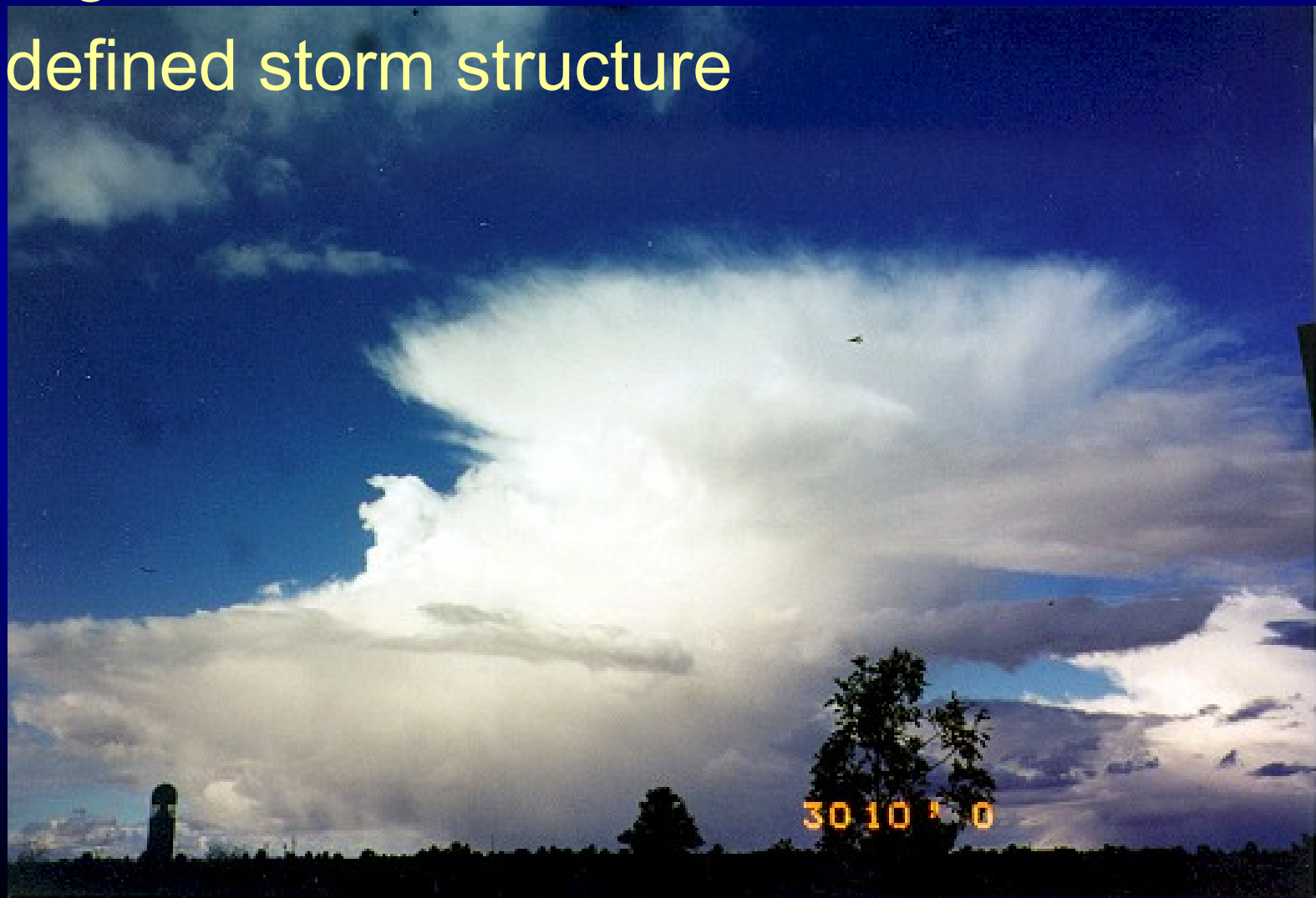
Sharp updraft edge

Well-defined structure

Weaker:

Fuzzy edges

Poorly defined storm structure



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- ✓ Step 1: Identify the updraft (and downdraft)
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- **Step 5: Look for visible rotation in updraft**

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- **Step 6: Watch updraft for wall cloud / tornado with rotation**

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- **Step 7: Watch downdraft for strong winds / hail**

Approaching Downdraft

Storm Spotting
Step – by - Step

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- ✓ Step 6: Watch updraft for wall cloud / tornado with rotation
- ✓ Step 7: Watch downdraft for strong winds / hail
- Step 8: Report critical information

Giving Effective Reports

Any Damage
Injuries / Fatalities
Wall Cloud
Funnel cloud
Tornado
Hail – all sizes
Wind gusts
- (40 mph or greater)

Heavy rainfall
- (1” or more per hour)

Flooding
Snow / Freezing Precip

Who: Identify yourself (“trained spotter”)

Where: Where you are, where you are looking

What: What you see

When: When you saw it (now? 5 minutes ago?)

Communication

How do I give my report?

Through your spotter network if the network is active and is communicating with the NWS.

Or direct to the NWS:

- Ham Radio
- Phone
- Internet

Contact your local NWS office for specific reporting information.

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Thank You!